As an important cause of baldness in men, the author places the wearing of stiff and heavy hats, which for hours together compress the blood-vessels of the scalp and impair its nutrition and that of the hair. points out that the common straw hat is often responsible for as much compression as the cylinder

The part played by general organic and nervous diseases in causing baldness and premature greyness is considered, and these conditions obviously demand treatment at the hands of the physician. The rôle of micro-organisms in the production of baldness is The *rôle* of perhaps insufficiently dealt with in the light of the work of Sabouraud and others in seborrhæa. Attention is, however, directed to the effects of the parasites of ringworm and favus. But in these diseases and in alopecia areata the patient will naturally seek medical

Though the work is obviously written as a popular treatise, its perusal will be of value to the medical practitioner, who very rarely gives attention to the subject, which is one of great interest to the public, who are only too ready to fly to various nostrums brought to their attention by assiduous advertisement.

Radiant Energy. A Working Power in the Mechanism of the Universe. By R. W. O. Kestel. (Port Adelaide, 1898.)

THE loose and unscientific use of terms, such as force, the curious absence of ordinary mechanical conceptions, as, for example, inertia, and the almost puerile objections raised against the Newtonian theory of planetary motion, sufficiently proclaim this book to be the work of the untrained amateur with original ideas. In consequence, none but a discerning reader will profit by its perusal. Yet the closing sentence—"Radiant Energy is a Working Power in the Mechanism of the Universe"—is a remarkable one, considering that the book is dated as having been published five years ago. The researches of Nichols and Hull in America, and Lebedew in Russia, on the pressure due to radiation have established the author's In the chapter on comets some of our present notions of the cause of comets' tails are clearly anticipated, but in applying the same idea to other parts of the mechanism of the universe, the author has fallen into the error of imagining a repulsion from the sun "just thirty thousand million times too large." The main idea is that "a repelling force radiating from the sun" "partakes of the sun's motion of rotation," and " is carried round in the direction the sun is revolving." The author justifies himself by mechanical analogies, and uses the idea to account for the origin of both the orbital and axial motions of the planets. By the aid of a model in which the repulsive force is represented by a stream of horizontal water jets emanating from a rotating nozzle, many of the phenomena of planetary motion, it is claimed, can be demonstrated experimentally. The idea, although so crudely expressed, when applied to our present knowledge does seem to possess a real value. Light, radiating from the sun, should, it seems, be affected by the rotation of the sun, in such a way that the resultant of the pressures from all parts of the solar surface which reach a planet passes through a point displaced from the centre in the direction of the edge approaching the planet. The same would apply to pressure exerted by normally projected corpuscles or electrons. The effect is to produce a positive acceleration of the planet in its orbit. Whether there is also a couple acting to produce rotation suggests a nice problem for the astronomer. possible that these infinitesimal pressures acting over Could these pressures maintain the planet in uniform motion through a resisting ether? These problems should now admit of a definite answer, and seem worthy of a more competent analysis than the reviewer is able to give.

Physikalisch-chemische Theorien. Von A. Reychler, nach der dritten Auflage des Originals bearbeitet von B. Kühn. Pp. xii+380. (Braunschweig: Vieweg und Sohn, 1903.) Price 9 marks.

For its compass this volume contains a wonderful amount of well-arranged material. It covers the ground usual in elementary works on physical chemistry, but by concise treatment of descriptive and theoretical matter the author finds room for much detail that has no place in other books of equal size. This gives it considerable value as an elementary work of reference, whilst it rather detracts from its suit-

ability to the needs of the beginner.

What will probably render the book most interesting to English readers is the substitution by the author of a peculiar hypothesis of hydrolytic dissociation for Arrhenius's hypothesis of electrolytic dissociation, which, however, is duly expounded in its place. The author conceives that when a salt is dissolved in water it dissociates into the corresponding acid and base, the degree of dissociation being presumably equal to that attributed to the salt by Arrhenius's theory. The behaviour of acids and bases themselves is explained by an auxiliary hypothesis which postulates the separation from the total solvent water of a special kind of water molecule which cannot pass an osmotic membrane permeable to the other water molecules. Unfortunately the author makes no attempt to carry out his theory in detail, and so the reader is left in a

somewhat dubious state of mind regarding its merits.

The author reproduces on p. 78 Traube's erroneous deduction of the degree of association of a liquid from the results of the volume method. A glance at the formula shows that it is only correct when x=1 or x=2, and is erroneous for all intermediate values.

Electrical Engineering Measuring Instruments. By G. D. Aspinall Parr. Pp. viii+328. (London: Blackie and Son, Ltd., 1903.) Price 9s. net.

Mr. Aspinall Parr has aimed at giving a description of all the leading electrical measuring instruments on the market, and he has carried out this object with a painstaking thoroughness worthy of a better cause. There can be few instruments enjoying any respectable sale which are not included in this book, and the descriptions are exceedingly clear; so also are the illustrations of the working parts, yet the reader gains little more from the book than he could gain, with perhaps a trifle more trouble, from a perusal of the makers' catalogues. "Fig. 70," to quote from the book, "shows the general appearance of this instrument with the index pointer set to year and the resistance. ment with the index pointer set to 102 and the pointer clamped at zero," and Fig. 70-a picture of a brass case and a paper scale—is typical of quite 50 per cent. of the 370 excellently reproduced illustrations. The importance of instruments to electrical engineers is not to be underrated, and it is quite true, as the author says in his preface, that the literature of the subject has been neglected. But the literature that is needed is not a collation of catalogues, but something that may guide the purchaser in selecting an instrument suited to his purpose. Mr. Parr makes a point of having avoided comparison, yet this is the very thing that is wanted; in many cases one can form no idea whether the instrument is suited for high or low voltages, for large or small currents, what is its possible that these infinitesimal pressures acting over infinite time could originate the motions of the planets? | accuracy under different conditions, or what even is the general accuracy obtainable with instruments of a

given type. There is a general discussion of the theory of each class of instrument, but this is of too fragmentary a nature to be of value; we may direct attention to the fact that the discussion of hot-wire instruments is incorrect; no mention is made of the cooling of the wire, and it is apparently assumed that the instrument is kept in the circuit for exactly one second whenever a measurement is made.

It is a pity, seeing how much trouble has been taken with the drawings of the working parts and the wide acquaintance with instruments which is evidenced, that Mr. Parr has not given us a more valuable work. As it is, the book may prove useful to those who may be called upon at any time to put something right in an instrument which has broken down.

M. S.

Life in Mind and Conduct: Studies of Organic in Human Nature. By Henry Maudsley, M.D. Pp. xv+444. (London: Macmillan and Co., Ltd., 1902.) Price 10s. 6d, net.

READERS of Dr. Maudsley's former volumes will find in the present work both the faults and the merits of its predecessors. Dr. Maudsley here, as always, writes with a great deal of epigrammatic felicity, and shows from time to time vivid flashes of insight into human character; here, too, as formerly, he often mars the effect of his epigrams by a tendency to re-elaborate them into rhetorical "common-places," in the technical sense of the term. The fundamental positions of the book may be reduced to three: the worlds of mind and of matter in reality form a single continuous evolu-tion; "whatever is, is right," being an inevitable result of the laws of that evolution; "private vices" are, as Mandeville taught, "public benefits," inasmuch as vice and virtue are alike expressions of the needs of the "social organism." On this last topic Dr. Maudsley writes a great deal that is striking and not a little that is true, but he never explains how upon his principles the recognition of any distinction between right and wrong can be other than an absurdity. If the whole of morality is devotion to the advancement of society, and if, again, the advancement of society is equally promoted by virtue and by crime (and this is what Dr. Maudsley more than once asserts), why should we make any distinction between the hero and the criminal? That God brings good out of evil is a truism; it does not follow that the evil is therefore as good as the good.

Elementary Bacteriology. By M. L. Dhingra, M.D., C.M., Edin., D.P.H., Camb. Pp. xiv + 145. (London: Longmans, Green and Co., 1903.) Price 3s. net.

From the preface we learn that this little book has been written especially for Indian students and practitioners. Too much has been attempted in the space, and the descriptions suffer from extreme brevity, only the fringe of the various subjects dealt with being reached. For example, no less than sixteen disease conditions are discussed in about forty pages, excluding the space allotted to illustrations, &c. The information given, so far as it goes, is as a rule accurate, the introductory portion upon the morphology and general biology of the bacteria being perhaps the most satisfactory. Subjects of especial interest to the Indian practitioner, e.g. protective inoculation against cholera, receive little more attention than many others which only indirectly concern him; actinomycosis is allotted more than a page, madura disease less than half a page. In the concluding portions of the book immunity, the principles of bacteriological technique, and antivenene are similarly dealt with. The book is well and sufficiently illustrated.

R. T. Hewlett.

NO. 1779, VOL. 69]

## LETTERS TO THE EDITOR.

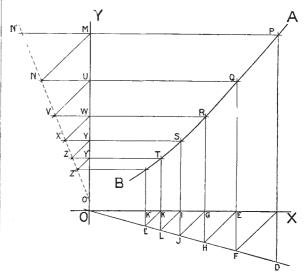
[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

## A Useful Empirical Formula.

My note in Nature of October 8 may be extended. I found that one of my pupils, Mr. Glasgow, was assuming that the expansion and compression parts of a gas engine diagram followed laws of the type  $pv^n$  constant; in cases where there was a probability that the clearance had not been measured accurately, so that v being the measured volume and c the constant error, he assumed  $p(v+c)^n$  to be constant, and he was enabled to find c from the curve. There is no reason to believe that these curves ought to have such a law, although, curiously enough, following this assumption, the clearance obtained from the compression curve is usually not very different from that obtained from the expansion curve. Mr. Glasgow's method of finding c is much the same as what I shall now describe. An empirical formula of the type

 $y = a + bx^n$ 

would be exceedingly useful in many parts of pure and applied science if, when given a table of values of y and x, we could readily find a, b and n. I have often sought for a method of working, but without success. If a is zero, we have only to plot  $\log y$  and  $\log x$  as the coordinates of points on squared paper. If a is not zero, there is a clumsy method of using logarithmic paper which may be adopted,



but it is not satisfactory. We now have a method easy of application. Thus values of x and y being given, draw the curve AB shown in the figure. Set off any convenient angle DOX. Select the point P. Draw PD, XF, FEQ, EH, &c., the lines XF, EH, &c., being at  $45^{\circ}$ . Project horizontally from the points PQR, &c., to M, U or N, W or V, &c., letting lines at  $45^{\circ}$  from M, U, &c., meet the horizontals at N, V, X, &c. If the above law holds, N, V, X, Z lie in a straight line. If they lie only approximately in a straight line, draw the line N'O' lying most evenly among them. Then OO' is the value of a, and n is

 $\log (i + \tan N'O'Y)/\log (i + \tan DOX),$ 

and b is readily found.

I may say that we have no great difficulty in testing whether a curve follows approximately a law like

 $y-\alpha=b(x-\beta)^n$ .

For this we have the curve on tracing paper, and we try as in the figure, then slide the curve a short distance in the direction x and try again, and so on. After a little study Mr. Glasgow has discovered a number of interesting properties of curves of these types.

John Perry.